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ABSTRACT

Achieving higher levels of physical fitness has become a goal of many Americans both for personal reasons (e.g., improved health, appearance, and perceived well-being) and for organizational reasons (e.g., corporate cost-savings with healthy employees, operational readiness for the military services). Understanding the factors which have an impact on physical fitness could help people improve their fitness levels. This study examined 1,357 Navy men to determine the impact of a variety of behavioral, psychological, and background factors on four components of physical fitness: (1) cardiorespiratory endurance (1.5-mile run); (2) muscular endurance (sit-ups); (3) flexibility (sit-and-reach test); and (4) body composition (estimated percent body fat). Controlling for exercise activities, physical fitness was positively associated with "wellness" behaviors (e.g., "watch my weight," "take vitamins"), believing that it is important to score high on physical fitness tests or that exercise will produce valued outcomes, and being athletic as a youth. Fitness was negatively associated with age, ever being overweight, smoking, and "preventive/avoidance" behaviors (e.g., "avoid getting chilled," "have first aid kit at home"). Identifying such factors may help to structure better fitness programs tailored to the individual. (Author)

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Abstract

Achieving higher levels of physical fitness has become a goal of many Americans both for personal reasons (e.g., improved health, appearance, and perceived well-being) and for organizational reasons (e.g., corporate cost-savings with healthy employees; operational readiness for the military services). Understanding the factors which have an impact on physical fitness could help people improve their fitness levels. This study examined 1,357 Navy men to determine the impact of a variety of behavioral, psychological, and background factors on four components of physical fitness: (a) cardiorespiratory endurance (1.5-mile run), (b) muscular endurance (sit-ups), (c) flexibility (sit-and-reach test), and (d) body composition (estimated percent body fat). Controlling for exercise activities, physical fitness was positively associated with "wellness" behaviors (e.g., "watch my weight;" "take vitamins"), believing that it is important to score high on physical fitness tests or that exercise will produce valued outcomes, and being athletic as a youth; fitness was negatively associated with age, ever being overweight, smoking, and "preventive/avoidance" behaviors (e.g., "avoid getting chilled;" "have first aid kit in home"). Identifying such factors may help to structure better fitness programs tailored to the individual.

Over the last several decades there has been a substantial increase in concern about healthful lifestyles in general and physical fitness in particular. This has been evident in both the public and private sectors (Fielding, 1984; Green, 1984). As early as the 1950's, government commissions were examining the issue of fitness among the Nation's youth, and programs were being developed to encourage physical fitness in school children (Hackett, Walters, and Leslie, 1983). By the late 1970's there had been a substantial increase in the number of people engaging in activities geared toward improving physical fitness (Powell & Paffenbarger, 1985; Stephens, Jacobs, & White, 1985). Big and small businesses now promote the availability of corporate health promotion activities as a fringe benefit (Rosen & Freedman, 1987; Behrens, 1985). Exercise clubs and sporting goods stores have sprung up everywhere. Warm-up suits and running shoes have become fashionable. Exercising to be physically fit has become accepted as an important component of overall health by millions of people.

Achieving good levels of physical fitness has become a goal of many both for personal reasons (e.g., improved health, appearance, and perceived well-being) and for organizational reasons (e.g., corporate cost-savings with healthy employees; operational readiness for the military services). Understanding the factors which have an impact on physical fitness could help people improve their fitness levels. Exercise activities certainly should have an impact on one's level of physical fitness. Yet, there are undoubtedly other behaviors (e.g., smoking; see Conway & Cronan, in press) which influence physical fitness. A variety of psychological variables such as values and attitudes towards physical fitness also might have an impact by influencing whether or not a person undertakes a fitness program or engages in other health-related behaviors (Dishman, Sallis, & Orenstein, 1985). Certain

background variables might also limit or enhance the degree of physical fitness a person can achieve (e.g., athletic activities as a youth). The purpose of this study was to examine a variety of behavioral, psychological, and background factors to determine which had a significant impact on four components of physical fitness.

Methods

Participants

Participants were 1,357 Navy men stationed aboard nine ships in the San Diego area. These men were participants in a larger study examining physical readiness among Navy personnel during 1984 (Conway & Dutton, 1985). The average age of the participants was 26.0 years (SD = 6.2) with a range from 18-51 years of age. Average number of years of schooling completed was 12.5 years (S.D. = 1.5), ranging from 8 to 20 years. Of 1,152 men who specified their race/ethnic group, 79% were Caucasian, 9% were Black, 5% were Hispanic/Puerto Rican, 4% were Malayan, 2% were Filipino, and 1% were of other race/ethnic groups. The median paygrade was E-4. Enlisted personnel comprised 93% and officers 7% of the sample, which slightly overrepresents enlisted personnel relative to the 88% found in the Navy at large (Naval Military Personnel Command, 1984). No female sailors were included in this study because only 3 of 90 San Diego-based ships had women assigned to them, and none of these ships became part of the group studied.

Measures

Physical Fitness. During 1984, the Physical Readiness Test (PRT) was required annually as part of the Navy's Health and Physical Readiness Program (Chief of Naval Operations, 1982). The PRT assesses four components of physical fitness which include the following: (a) 1.5-mile

run (stamina and cardiorespiratory endurance): time to run/walk 1.5 miles on a relatively flat, smooth surface; (b) sit-ups test (muscular endurance): number of bent-knee sit-ups done in a 2-minute period; (c) sit-reach test (flexibility): person sitting on floor with knees straight reaches as far forward as possible and touches the ground between legs; distance stretched beyond the heels scored as positive inches, and those short of the heels as negative inches; (d) body composition (estimated percent body fat): computed from an equation using two body circumferences: (i) neck circumference, measured around the neck with the tape passing just below the larynx, and (ii) abdominal circumference, measured around the abdomen at the level of the umbilicus (Wright, Dotson, & Davis, 1981).

Self-Reported Survey Measures. Participants completed self-report surveys asking about a variety of health- and fitness-related behaviors, attitudes, values, and perceptions, as well as background and demographic items. The variables examined in this report fall into three general categories: behavioral, psychological, and demographic/background.

Behavioral variables: Seven behavioral variables were derived from self-reports about behaviors involving exercise habits, substance consumption, and a variety of general health behaviors. Two components for each of eight exercises (running, walking, swimming, bicyling, racquet sports, aerobics, weight lifting and calisthenics) were assessed: (a) frequency (i.e., times per week or month an exercise was done), and (b) duration (i.e., time spent exercising during a workout period). An exercise activity scale was computed as the sum of the frequency-by-duration cross-product for each exercise.

Substance consumption measures were self-reports about smoking,

caffeine consumption, and alcohol consumption. The average amount of tobacco smoked per day was indicated on a 10-category response scale: 0, 1-5, 6-10, 11-15, 16-20, 21-25, 26-30, 31-35, 36-40, and 41+ of cigarettes, cigars, and/or pipefuls of tobacco smoked per day. Respondents answered three separate questions concerning the average number of caffeinated cups of coffee, cups or glasses of tea, and soft drinks consumed per day; responses were summed to estimate the average number of caffeinated drinks consumed per day. An estimate of weekly alcohol consumption was calculated by multiplying the reported number of days on which the respondent drank alcohol by the usual number of drinks taken on those days.

Responses reflecting the practice of 56 other health behaviors were averaged for three additional scales: (a) "wellness" behaviors (11 items such as "watch my weight;" "take vitamins") (alpha = .78), (b) "preventiv /avoidance" behaviors (21 items such as "have first aid kit in home;" "avoid getting chilled") (alpha = .83), and "risk-taking" behaviors (12 items such as "drive after drinking;" "cross the street against the light") (alpha = .79).

Psychological variables: Ten variable reflecting beliefs and values regarding health and fitness included the following: (a) 6-item scale reflecting expectancies that exercise would lead to valued outcomes (alpha = .93), (b) 2-item scale regarding expectations about reaching and/or maintaining one's ideal weight (alpha = .86), (c) 2-item scale regarding expectations about stopping smoking and/or remaining a non-smoker (alpha = .95), (d) 2-item scale regarding expectations about exercising regularly (alpha = .91), (e) 3-item scale on the importance of physical fitness, including regular exercise and weight control (alpha = .89), (f) 2-item scale on the importance of good health (alpha = .90), (g) 2-item scale on

the importance of scoring high on the fitness tests (alpha = .83), and (h) three single items on the importance of stopping smoking and/or remaining a non-smoker, of being physically attractive to others, and of doing one's job well.

Background variables: The six variables examined were: (a) current age, (b) years of schooling, (c) 2-item scale on whether the participant was overweight as a child and adolescent (alpha = .89), (d) 2-item scale on how athletic the person was as a child and adolescent (alpha = .91), (e) 2-item scale on whether one had ever had a weight problem (alpha = .62), and (f) a single item about other blood relatives having an overweight problem.

Results and Discussion

Multiple regression analyses were computed to determine the best predictors of each of the four components of physical fitness. Because exercise should be a primary determinant of physical fitness, the exercise activities scale was forced to enter the equation first. All other variables were allowed to enter the equation in a forward stepwise manner. This procedure made it possible to determine factors which uniquely predicted the physical fitness measures above and beyond the exercise a person reported. Of the 23 variables examined, 12 entered as significant ($p < .05$) predictors of at least one of the four components of physical fitness. These 12 are noted on all four tables which follow.

Better performance on the 1.5-mile run was predicted (R =.59) by eight variables: four in a positive direction (exercise activities, self-rating of the importance of scoring high on the physical fitness tests, education, and being athletic as a youth) and four in a negative direction (age, average amount smoked per day, self-rating of ever being overweight, and the preventive/avoidance health behaviors scale).

PREDICTORS OF BETTER 1.5-MILE RUN PERFORMANCE

	Beta
BEHAVIORAL	
Exercise Activities [Forced 1st into equation]	.06 ns
Tobacco Use (amount smoked per day)	-.17 ***
"Wellness" Behaviors (e.g., "watch my weight" "take vitamins")	---
"Preventive/Avoidance Behaviors (e.g., "avoid getting chilled" "first aid kit in home")	-.11 *
PSYCHOLOGICAL	
Importance of High Physical Fitness Test Scores	.23 ***
Believe Exercise Produces Valuable Outcomes	---
Expect to Reach/Maintain Ideal Weight	---
BACKGROUND	
Age	-.30 ***
Education	.14 **
Athletic as a Youth	.11 *
Ever Overweight	-.20 ***
Overweight as a Youth	---
Multiple R:	.59
Variance accounted for:	34.8%

* p < .05 ** p < .01 *** p < .001

The number of sit-ups a person could do was predicted (R =.55) by seven variables: four in a positive direction (exercise activities, the wellness health behaviors scale, expectancy that exercise would produce valued outcomes, being athletic as a youth) and three in a negative direction (age, the preventive/avoidance health behaviors scale, and tobacco use).

PREDICTORS OF SIT-UP TEST PERFORMANCE

	Beta
BEHAVIORAL	
Exercise Activities [Forced 1st into equation]	.11 *
Tobacco Use (amount smoked per day)	-.13 *
"Wellness" Behaviors (e.g., "watch my weight" "take vitamins")	.22 **
"Preventive/Avoidance Behaviors (e.g., "avoid getting chilled" "first aid kit in home")	-.14 *
PSYCHOLOGICAL	
Importance of High Physical Fitness Test Scores	---
Believe Exercise Produces Valuable Outcomes	.20 ***
Expect to Reach/Maintain Ideal Weight	---
BACKGROUND	
Age	-.19 ***
Education	---
Athletic as a Youth	.11 *
Ever Overweight	---
Overweight as a Youth	---
Multiple R:	.55
Variance accounted for:	29.9%

* p < .05 ** p < .01 *** p < .001

Sit-reach flexibility was predicted (R =.31) by three variables: all in a positive direction (exercise activities, expectation of reaching and/or maintaining one's ideal weight over the next year, and self-rating of the importance of scoring high on the physical fitness test scores).

PREDICTORS OF SIT-REACH FLEXIBILITY

	Beta
BEHAVIORAL	
Exercise Activities [Forced 1st into equation]	.07 ns
Tobacco Use (amount smoked per day)	---
"Wellness" Behaviors (e.g., "watch my weight" "take vitamins")	---
"Preventive/Avoidance Behaviors (e.g., "avoid getting chilled" "first aid kit in home")	---
PSYCHOLOGICAL	
Importance of High Physical Fitness Test Scores	.15 *
Believe Exercise Produces Valuable Outcomes	---
Expect to Reach/Maintain Ideal Weight	.18 **
BACKGROUND	
Age	---
Education	---
Athletic as a Youth	---
Ever Overweight	---
Overweight as a Youth	---
Multiple R:	.31
Variance accounted for:	9.4%

* p < .05 ** p < .01 *** p < .001

Higher levels of estimated percent body fat were predicted (R =.63) by six variables: four in a positive direction (self-rating of ever being overweight, age, being overweight as a child and adolescent, and the preventive/avoidance behaviors scale) and two in a negative direction (exercise activities, the wellness health behaviors scale).

PREDICTORS OF PERCENT BODY FAT

	Beta
BEHAVIORAL	
Exercise Activities [Forced 1st into equation]	-.01 ns
Tobacco Use (amount smoked per day)	---
"Wellness" Behaviors (e.g., "watch my weight" "take vitamins")	-.20 **
"Preventive/Avoidance Behaviors (e.g., "avoid getting chilled" "first aid kit in home")	.12 *
PSYCHOLOGICAL	
Importance of High Physical Fitness Test Scores	---
Believe Exercise Produces Valuable Outcomes	---
Expect to Reach/Maintain Ideal Weight	---
BACKGROUND	
Age	.17 ***
Education	---
Athletic as a Youth	---
Ever Overweight	.49 ***
Overweight as a Youth	.13 *
Multiple R:	.63
Variance accounted for:	39.8%

* p < .05 ** p < .01 *** p < .001

In summary, these results indicate that, above and beyond the exercise one gets, various behavioral, psychological, and background factors can be identified as correlates of physical fitness. Behaviors such as not smoking and the general tendency to engage in "wellness" behaviors but not "preventive/avoidance" behaviors were associated with higher levels of physical fitness. Psychological variables such as believing that it is important to score high on physical fitness tests, that exercise will produce valued outcomes, and that one can reach/maintain ideal weight also predicted higher fitness levels. Background variables such as age, ever being overweight, not being athletic as a youth, and being overweight as a youth were related to lower physical fitness. Causal models explaining how these factors interrelate now need to be developed. Understanding how such factors influence each other may help us structure better interventions and fitness programs tailored to the individual. Such programs might help people set more realistic personal goals and be more likely to meet their goals for improving physical fitness.

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